

REMARKS

In the Office Action the Examiner noted that claims 1 and 2 were pending in the application and the Examiner rejected both claims. By this Amendment, claims 1 and 2 have been amended and new claims 3 and 4 have been added. Thus, claims 1-4 are pending in the application. The Examiner's rejections are traversed below.

The Rejections

On pages 2 and 3 of the Office Action the Examiner rejected claims 1 and 2 as anticipated by U.S. Patent 5,526,643 to Mukaihira et al. or as anticipated by U.S. Patent 6,644,021 to Okada et al.

The Prior Art

The Mukaihira et al. reference is directed to a system for diagnosing deterioration of a catalyst. The temperature of the catalyst is estimated using an operating state signal of the engine by using a diagnostic device. The conversion efficiency of the catalyst is calculated from the output of oxygen sensors. The deterioration state of the catalyst is diagnosed on the basis of the corrected temperature by the diagnostic device. Mukaihira et al. does not disclose features relating to regeneration control for a catalyst, nor does it disclose prohibition of a rich condition control based on a detected temperature.

U.S. Patent No. 6,644,021 to Okada et al. is directed to an exhaust gas purifying apparatus of an internal combustion engine in which the temperature of an occlusion-type NOx catalyst is increased to emit SOx when the temperature of the occlusion-type NOx catalyst is not less than a set temperature. This is done to prevent deterioration of fuel consumption and to enable the regeneration of a catalyst device by efficiently desorbing a sulfur compound from the catalyst device. In particular, Okada et al. discloses performing S purge control to control the regenerating of the catalyst device by desorbing a sulfur compound from the catalyst.

Claims 1 and 2 Distinguish Over the Prior Art

It is submitted that neither Mukaihira et al. nor Okada et al. discloses the feature of prohibiting rich condition control based on whether the temperature detected by a catalyst temperature detector, is greater than a set temperature which is within a predetermined temperature range of between 400°C and 500°C.

Mukaihira et al. relates to diagnosis of the deterioration state of a catalyst and does not contain any description of regeneration control or prohibition of a rich condition control as set

forth in the claims.

Okada et al. describes a process related to an occlusion-type NOx catalyst. In contrast, the present claimed invention relates to a direct reduction-type NOx catalyst which has different characteristics than the occlusion-type NOx catalyst. Further, the present invention does not relate to restoration from poisoning with sulfur but to a restoration of the capacity to directly reduce NOx. As pointed out in paragraphs 11-13 of the specification, the present invention was developed based on particular characteristics of direct reduction-type catalysts. Further, as explained in paragraph 42 of the specification, the present invention provides a method and system in which the temperature range of the catalyst for the concentration of NOx at the catalyst outlet, is increased during rich condition control, is avoided. Therefore, the NOx in the exhaust gas can be efficiently purified while the NOx prevented from being discharged into the atmosphere. In addition, fuel costs are produced.

Referring to claim 1, it is submitted that none of the prior art teaches or suggests:

“A method for regenerating a NOx catalyst in a NOx purifying system having a direct reduction type NOx catalyst provided in an exhaust passage and directly decomposing NOx during a lean condition operation and being regenerated during a rich condition operation, comprising prohibiting a rich condition control when the temperature detected by a catalyst temperature detector is greater than a set temperature which is within a predetermined temperature range of between 400°C and 500°C.”

Therefore, it is submitted that claim 1 patentably distinguishes over the prior art.

Referring to claim 2, it is submitted that the prior art does not teach or suggest the claimed NOx purifying system for a direct reduction type NOx catalyst:

“A NOx purifying system direct reduction type NOx catalyst provided in an exhaust passage and directly decomposing NOx during a lean condition operation and being regenerated during a rich condition operation, which comprises a catalyst temperature detector, and a control device to prohibit a rich condition control when the temperature detected by the catalyst temperature detector is greater than a set temperature which is within a predetermined temperature range of between 400°C and 500°C.”

Therefore, it is submitted that claim 2 patentably distinguishes over the prior art.

New Claims 3 and 4

New claim 3 is directed to a method for regenerating a direct reduction type NOx catalyst which includes:

detecting the direct reduction type NOx catalyst temperature; and
regenerating the NOx while performing a rich condition
operation only when the detected temperature is less than a set
temperature which is between 400°C and 500°C.

Therefore, it is submitted that claim 3 patentably distinguishes over the prior art.

New claim 4 is directed to a NOx purifying system having a direct reduction type NOx catalyst which includes:

a catalyst temperature detector detecting a temperature of the
direct reduction type NOx catalyst; and
a control device causing a rich condition control to be
performed only when the temperature detected by the catalyst
temperature detector is less than a set temperature which is
between 400°C and 500°C.

Therefore, it is submitted that claim 4 patentably distinguishes over the prior art.

Summary

It is submitted that none of the references, either taken alone or in combination, teach the present claimed invention. Thus, claims 1-4 are deemed to be in the condition suitable for allowance. Reconsideration of the claims and an early Notice of Allowance are earnestly solicited.

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

Serial No. 10/774,490

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

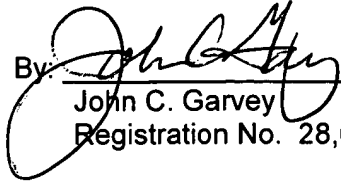
Respectfully submitted,

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Date: _____

8-4-05

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AMENDMENTS TO THE DRAWINGS:

The attached drawings include changes to FIG. 2. The sheet containing FIG. 2 replaces the original sheet including FIG. 2.

For the convenience of the Examiner, an annotated sheet showing the changes made is attached. Approval of these changes to the Drawings is respectfully requested.



Fig.2

